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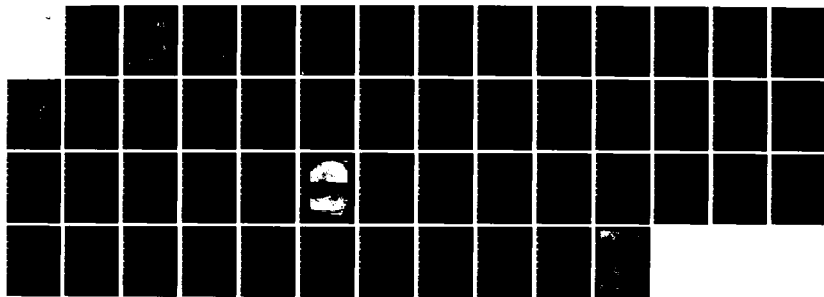
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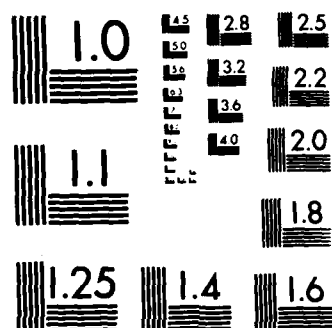
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A Total Systems Approach To Environmental Problems

ARCHAEOLOGICAL INVESTIGATIONS AT SITE 41 TV 383,
LOWER BOGGY CREEK, COLORADO RIVER
DRAINAGE, TRAVIS COUNTY, TEXAS

Prepared for
FORT WORTH DISTRICT, U.S. CORPS OF ENGINEERS
Contract No. DACW63-83-D-0005

Prepared by
Olin F. McCormick and Louis E. Alderson

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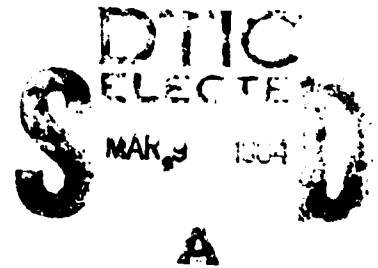
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Coastal Ecosystems Management, Inc.
3600 Hulen Street
Fort Worth, Texas 76107

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- 19. Central Texas
 - Archaeology
 - / National Register of Historic Places
 - Faunal analysis
 - Late Archaic/Neo American
 - Shell gathering camp

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INTRODUCTION

The investigations described in this report were designed to assess the potential of site 41 TV 383 for nomination to the National Register of Historic Places. This study was conducted in order to determine possible damage to the resource from proposed channelization of Boggy Creek for flood control purposes (Figures 1, 2).

The Fort Worth District Corps of Engineers (COE) contacted Coastal Ecosystems Management, Inc. (C.E.M.) in late June 1983 in order to initiate investigation of the site under the Indefinite Delivery Contract DACW63-83-D-0005. Field investigations were accomplished in early July 1983. The scope-of-work required completion of the following tasks:

1. Testing of site 41 TV 383 to recover evidence for determination of site size, boundaries, age, cultural affiliations, function, and significance.
2. Analysis of recovered material and data using standard archaeological techniques; as well as conducting special analyses such as palynological, geomorphological, floral, faunal, and radiocarbon, as applicable.
3. Preparation of a report containing theory, methodology, data interpretation, and recommendations.
4. Preparation of National Register forms.
5. Preparation and storage of collected materials and data at the Texas Archaeological Research Laboratory (TARL) in Austin, Texas.

The investigation team consisted of the following individuals: Dr. R.H. Parker, Principal Investigator and Ecologist; O.F. McCormick, Project Archaeologist; Dr. W.E. French, Geologist; Dr. L.E. Alderson, Wildlife Biologist and Botanist; R.N. Wilkenson, Archaeologist; Kevin Leehan, Archaeologist; and

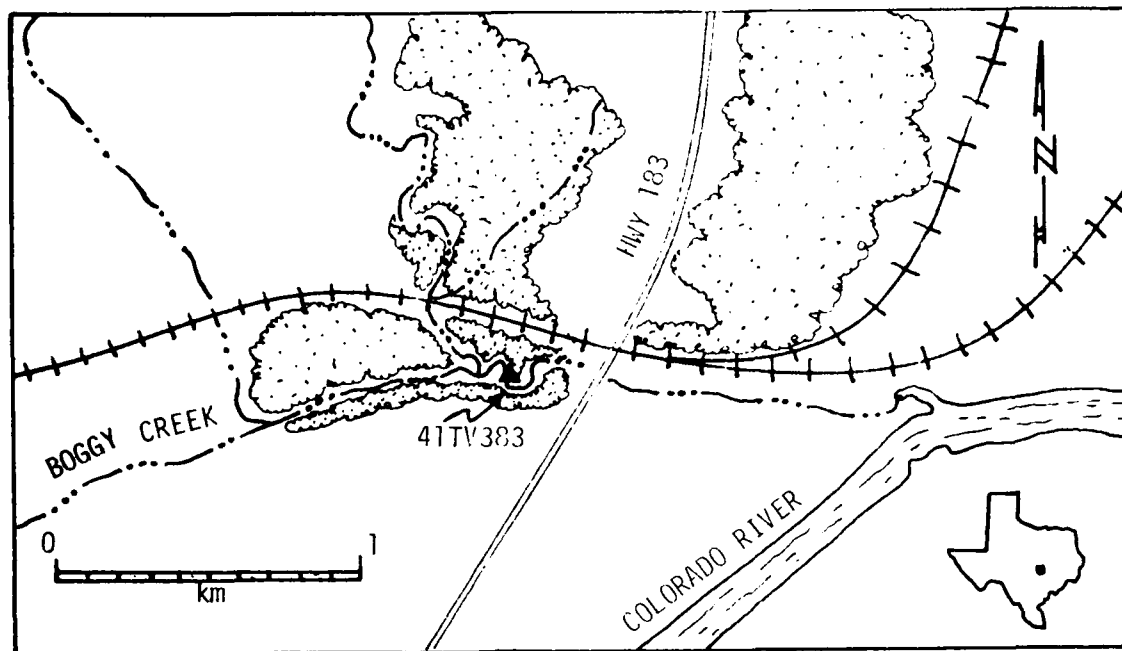


Figure 1. General Location of Site 41 TV 383.

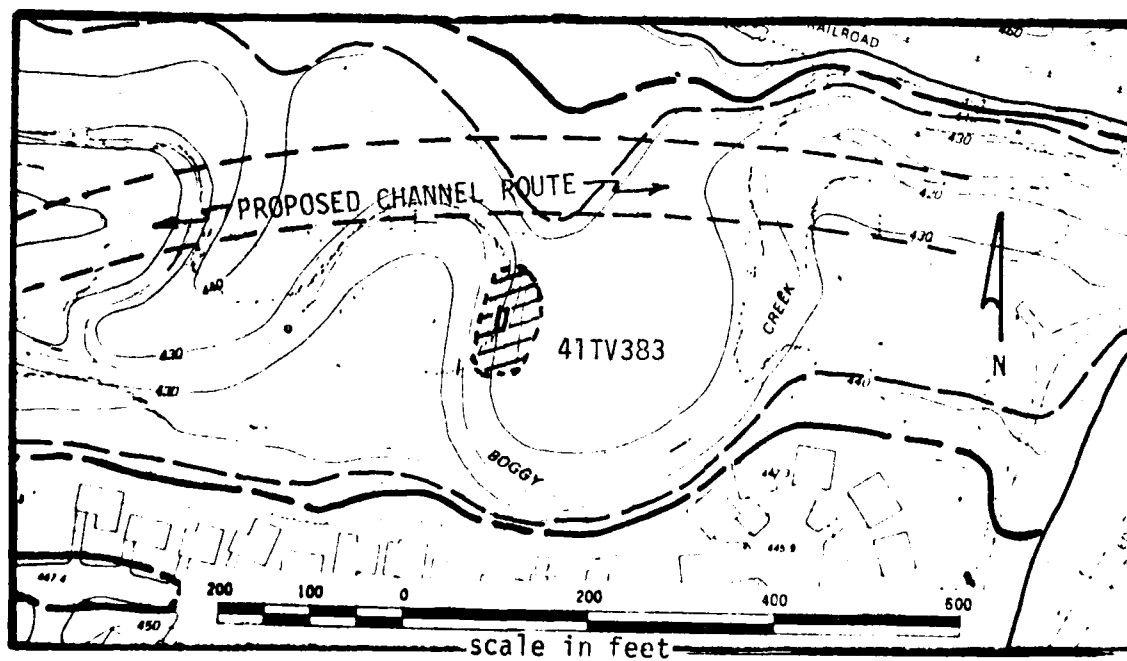


Figure 2. Site 41 TV 383 in Relationship to Proposed Channelization.

Vance Langley, Archaeologist.

Identification and discussion of the mollusks was accomplished by Dr. R.H. Parker. Bone identification was handled by Ms. Bonnie Yates of the Institute of Applied Sciences at North Texas State University. Geological interpretation of the environment of deposition was provided for by Dr. W.E. French.

SITE DESCRIPTION

Site 41 TV 383 is located along the western edge of the only prominent meander loop on the southern end of Boggy Creek (Figure 2). Unfortunately, it is on the cutbank side of the creek and has suffered moderately heavy erosion since its discovery in 1978.

Environmental Setting

Modern man has impacted the study area extensively. Immediately to the south of the site the entire area has been developed for low-income housing. Two railroad lines have been cut through the area some 400 feet to the north; and U.S. Highway 183 crosses the creek approximately 650 feet to the east. Several areas upstream from the site have been and are presently being used as trash dumps. Additional modern cultural debris has been added to the creek environment as a result of several attempts to contain erosion of the southern bank of the creek by filling gullies with nonbiodegradable trash.

The study area lies in a region that encompasses a juxtaposition of environmental categories which make it difficult to place it in specific, exclusive classifications without running the risk of oversimplification. However, it has been described from several points of view. The U.S. Soil Conservation Service (SCS) has prepared maps of soils of the area showing that they are

comprised primarily of calcareous clays [U.S. Department of Agriculture, Soil Conservation Service (hereinafter referred to as SCS) 1972, 1974]. The general area of the site is located in the Texan biotic province (Figure 3) close to the boundaries of the Balconian and Tamaulipan biotic provinces (Blair 1950). The site is located, also, within the Blackland Prairies vegetational area (Figure 4), but on a slender digitation surrounded by three other vegetational areas (Gould 1969). This positioning virtually assures the contribution of diversity of flora and fauna to the study area from a number of sources, as it lies in an ecotone that is on boundaries of several different kinds of environments.

Edaphic factors appear to have a strong influence on plant cover of the study area. Except for sands occurring in the stream channel and on the west bank of Boggy Creek, most of the adjacent soils are tight, dark clays interspersed with a few light colored layers. These soils have been described by the Soil Conservation Service as a composite of Houston Black-Heiden, Trinity, and Travis silty clays (SCS 1974). If this were a strictly undisturbed upland area, most of it would probably support a tall- or mid-grass prairie, except adjacent to creeks, which would be comprised of big bluestem, little bluestem, silver bluestem, Texas winter-grass, Indian grass, side-oats grama, buffalo grass, several other grasses, a number of forbs, and a few shrubby species. With the exception of blackjack and post oak, most of the trees in this soil grouping are restricted to narrow strips (varying in width from 25 to 250 meters) along creek margins. Tree species commonly found in this habitat include cottonwood, blackjack oak, sycamore, elm, hackberry, post oak, and an occasional pecan where Trinity soils exist (SCS 1974). This kind of plant cover would undoubtedly have prevailed during fairly recent geologic times.

The site, however, is located on a streambank and floodplain habitat surrounded by urban areas and has undoubtedly been influenced by both on-site and

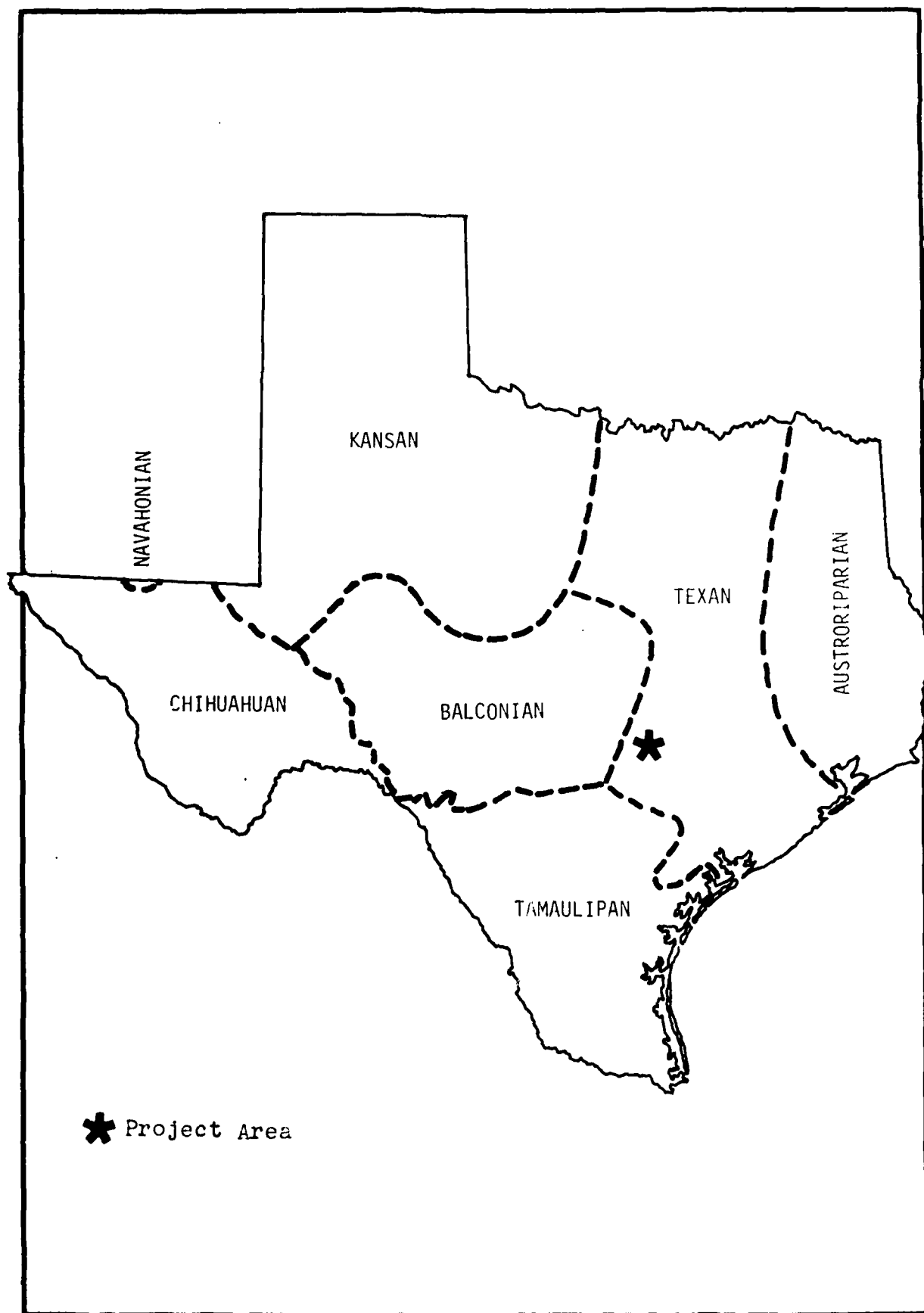
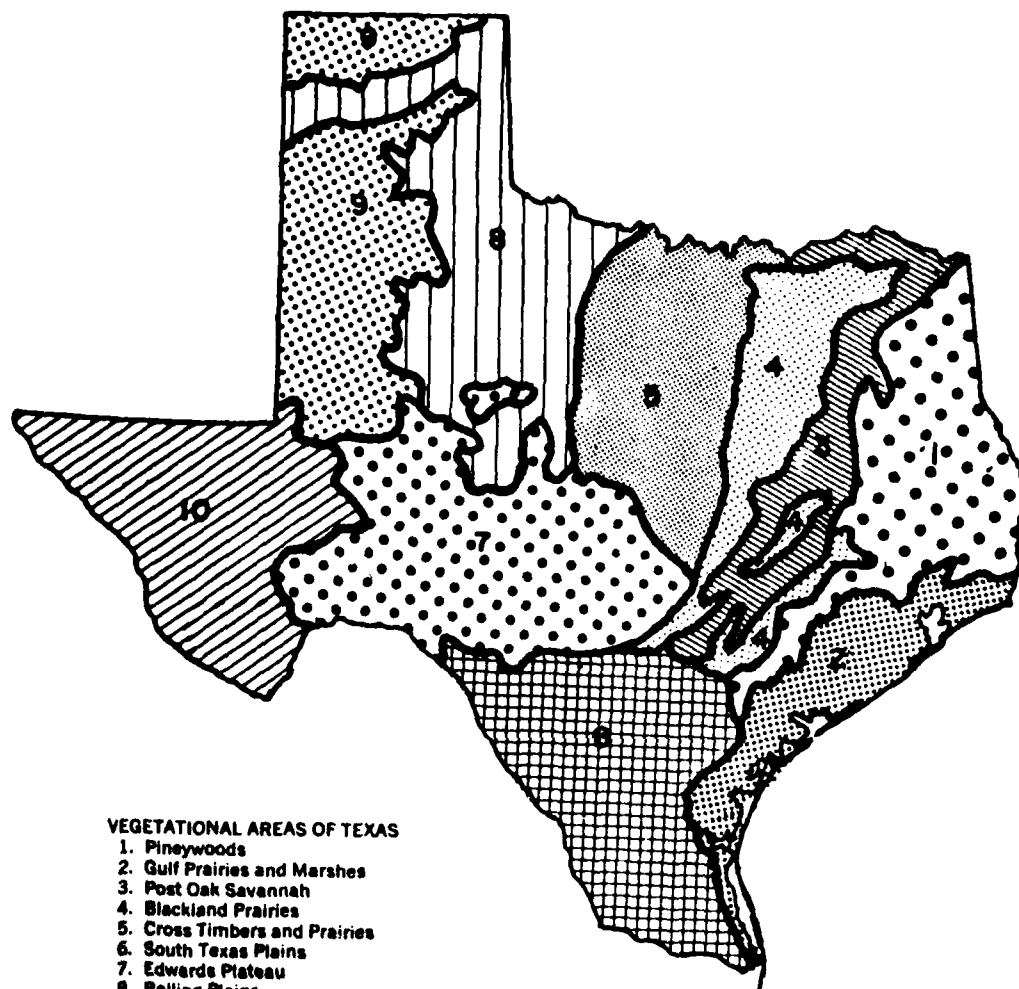


Figure 3. Biotic Provinces of Texas, according to Blair (1950).



- VEGETATIONAL AREAS OF TEXAS**
1. Pineywoods
 2. Gulf Prairies and Marshes
 3. Post Oak Savannah
 4. Blackland Prairies
 5. Cross Timbers and Prairies
 6. South Texas Plains
 7. Edwards Plateau
 8. Rolling Plains
 9. High Plains
 10. Trans-Pecos, Mountains and Basins

Figure 4. Biological Areas of Texas, Supporting Specific Plant and Animal Communities. Source: Gould (1969)

off-site environmental disturbances. Its general appearance now is certainly not that of a grasslands, as it is covered by trees, shrubs, and vines--some of which are exotic and/or ornamental species escaped from domestication. The few grass species that occur there do so in extremely sparse stands. Except for an obviously mature stand of large pecan trees on the west side of the creek, much of the other plant cover could represent a plant succession taking place in response to disturbance. Historically, agricultural activity associated with early settlements by Europeans could have occurred from the 1840's through the 1880's. If the area ever had been plowed for farming, it is likely that the activity did not last long, as the soils of this series are considered unsuitable for long-term cultivation (SCS 1974). There is no evidence within the area of recent use by domestic livestock. Urban and industrial activities on the watershed have also caused considerable change in streamflow and flooding, so that profound disturbances are continuing to the present time.

Streambed and Bank Geology and Geomorphology

The entire study area is located within both the active and fossil floodplain of the Colorado River. The present valley of Boggy Creek is composed of entrenched meanders incised into the old Colorado alluvial deposits. Based on existing contours, it is probable that Boggy Creek now follows an old Colorado River channel through the floodplain.

There is evidence of two stages of down cutting with an intervening period of deposition during which the deposits containing site 41 TV 383 were deposited. During the first episode, the Colorado River meandered to the south and away from the floodplain edge. This meander allowed Boggy Creek to enter the floodplain and to cut eastward along an old channel scar of the Colorado. This process appears to have operated in a similar manner with Walnut Creek to the east of the study area, creating a relatively straight valley some 200 feet in width.

The second episode was aggradational, most probably in response to the Colorado reaching its grade. During this time, much of the Boggy Creek valley filled with Quaternary sand, silt, and clays originating in the upland Glenrose, Walnut, and Edwards Cretaceous formations. Site 41 TV 383 is located totally within these alluvial and colluvial sediments.

The last meander episode consisted of renewed down cutting, resulting in the entrenched meandering of the present course of Boggy Creek and the subsequent exposure of the archaeological deposits (Figure 5).

The sand as well as the chert and quartzite cobbles forming the point-bar deposits on the creek bed also had their origin in the Edwards and Quaternary deposits of the Edwards Plateau. These were originally carried off the Plateau by the Colorado River, and can be found today, as evidenced by gravel operations, in old channels of the Colorado downstream from the site area.

Soils

The project area lies within the Houston Black-Heiden Association of clayey soils (SCS 1974). Specifically, the floodplain of Boggy Creek is comprised of frequently flooded Trinity clays. This continual flooding, at times more than once a year, causes continually changing scour and depositional patterns. Basal soil for the Trinity series is an olive-gray (Munsell reference color 5Y 6/2) clay which was observed forming the channel bottom in the creek directly below the site.

The older floodplain deposits appear to be part of the Travis series of gravelly, sandy clay which is predominant in the uplands to the north of the site. This soil makes up the old valley floor, and is exposed in the cutbank across from the site and in a small section just north of the deposits containing the cultural materials. It appears that the Trinity and Houston soils are inset against the Travis soils. The Travis series soils are quite distinctive in

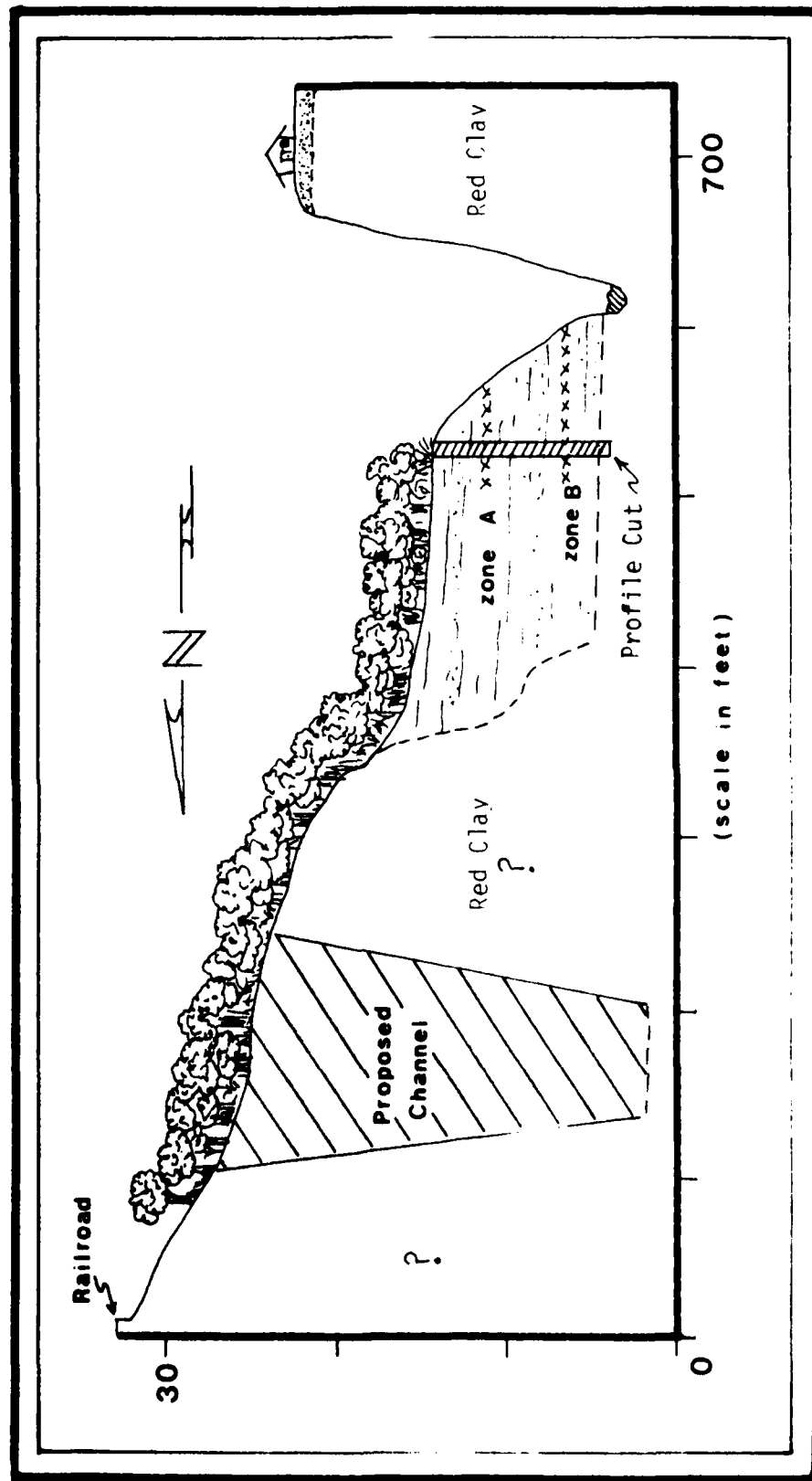


Figure 5. Hypothetical Cross Section of Boggy Creek Valley at Site 41 TV 383.

color, grading from a reddish brown (5YR 4/4) to a yellowish red (5YR 5/6) gravelly sandy clay.

Flora

A list of vascular plant taxa observed and collected on the study area from 27 June 1983 through 30 June 1983 is provided in Table 1. The list represents only very incomplete samples of some of the more prominent taxa and does not begin to represent all the species that might be present. The aspect now is almost that of an Eastern bottomland and woodland, but one having enough plants from semiarid provinces to lend it a slightly western air.

If the area ever was part of a prairie type environment, it certainly has not regenerated to grassland, and is evidently fairly complex now. It appears that any humans or animals occupying the area in Recent geologic times would have had access to a wide variety of plants here, some of which could have provided food, fiber, shelter, and other benefits.

In order to acquire more definite information about the history of the vegetational succession in recent times, ring cores were obtained by increment borings from three of the largest trees in the study area. The taxa, diameter at breast height, and estimated ages are shown in Table 2. The pecan tree was on the southwest side of the stream and was the largest specimen of several similar trees of the same species occurring in a stand, or small natural grove. Judging by the estimated age of the one specimen, these trees have been in place several centuries, indicating considerable stability in plant succession, land use, and recent physical history there.

The site locale was considerably lower than the top of the bank on the other side of the stream; hence, there is more likelihood of flooding and less chance that anyone would have wanted to clear and cultivate it. On the east side of the stream near the archaeological site excavation, however, the ash and

Table 1. Vascular plants observed and/or collected by Coastal Ecosystems Management, Inc. on Boggy Creek site in Austin, Travis County, Texas, 27 June 1983 through 30 June 1983.

Taxa	Observed Only	Observed and Collected
CYPRESS FAMILY		
Cupressaceae Bartl.		
<u>Juniperus virginiana</u> L. Eastern red cedar		X
GRASS FAMILY		
Gramineae Juss.		
<u>Chasmanthium latifolium</u> (Michx.) Yates Inland sea oats	X	
<u>Elymus virginicus</u> L. Wild-rye	X	
<u>Sorghum halepense</u> (L.) Pers. Johnson grass	X	
PINE-APPLE FAMILY		
Bromeliaceae Juss.		
<u>Tillandsia recurvata</u> L. Ball moss		X
SPIDERWORT FAMILY		
Commelinaceae R. Br.		
<u>Commelina communis</u> L. Day-flower		X
WILLOW FAMILY		
Salicaceae Mirb.		
<u>Salix nigra</u> Marsh. Black willow	X	
<u>Populus deltoides</u> Marsh. Eastern cottonwood	X	
WALNUT FAMILY		
Juglandaceae Kunth		
<u>Carya illinoensis</u> (Wang.) K. Koch Pecan	X	
BEECH FAMILY		
Fagaceae Dum.		
<u>Quercus macrocarpa</u> Michx. Bur oak	X	
<u>Quercus texana</u> Buckl. Texas red oak	X	

Table 1. (continued)

Taxa	Observed Only	Observed and Collected
ELM FAMILY		
Ulmaceae Mirb.		
<u>Celtis laevigata</u> Willd. Texas sugarberry	X	
<u>Ulmus crassifolia</u> Nutt. Cedar elm		X
MOONSEED FAMILY		
Menispermaceae Juss.		
<u>Cocculus carolinus</u> (L.) DC. Snailseed		X
ROSE FAMILY		
Rosaceae Juss.		
<u>Crataegus</u> sp. L. Hawthorn		X
MAHOGANY FAMILY		
Meliaceae Juss.		
<u>Melia azedarach</u> L. Chinaberry-tree	X	
SUMAC FAMILY		
Anacardiaceae Lindl.		
<u>Rhus toxicodendron</u> L. Poison ivy	X	
BUCKEYE FAMILY		
Hippocastanaceae DC.		
<u>Aesculus pavia</u> L. Red buckeye		X
GRAPE FAMILY		
Vitaceae Juss.		
<u>Vitis vulpina</u> L. Fox grape		X
DOGWOOD FAMILY		
Cornaceae Dum.		
<u>Cornus drummondii</u> C.A. Mey. Rough-leaf dogwood		X

Table 1. (concluded)

Taxa	Observed Only	Observed and Collected
OLIVE FAMILY		
Oleaceae Hoffmsg. & Link		
<u>Fraxinus</u> sp. L.		
Ash	X	
<u>Ligustrum japonicum</u> Thumb.		
Japanese privet		X
MORNING GLORY FAMILY		
Convolvulaceae Juss.		
<u>Calystegia sepium</u> (L.) R. Br.		
Hedge-bindweed		X
CATALPA FAMILY		
Bignoniaceae Juss.		
<u>Campsis radicans</u> (L.) Seem.		
Trumpet-honeysuckle		X
ASTER FAMILY		
Asteraceae		
<u>Lactuca serriola</u> L.		
Prickly lettuce		X

Table 2. Dimensions and estimated ages of trees found on site 41 TV 383 area.

Specimen	Diameter at Breast Height (DBH)		Estimated Age (years)
	Inches	Centimeters	
Ash <u>Fraxinus</u> sp. L.	26	65	101
Cedar elm <u>Ulmus crassifolia</u> Nutt.	18	46	69
Pecan <u>Carya illinoensis</u> (Wang.) K. Koch	72	180	260+

cedar elm that were examined were only a century or less in age. All other vegetational types found in this vicinity were smaller and obviously even younger than the cored trees. Thus, it is possible that the east side of the creek was cleared and/or farmed as late as the 1870's or early 1880's. Considering the universally highly alkaline reaction of these clay soils, however, it is probable that a very limited variety of crops could be grown on them. The Soil Conservation Service has stated that the only tree suited for growth to maturity on these soils is the pecan (SCS 1974), and we found no reason to disagree with that conclusion.

Fauna

Fauna known to occur or having occurred in recent times in this area include 49 mammalian, 2 turtle, 16 lizard, 39 snake, 5 urodele, and 18 anuran species (Blair 1950), but most of these are now denied use of or access to the study area because of intensive agricultural and urban land use around it. It is probable that there were at least moderate populations of white-tailed deer, Odocoileus virginianus; bison, Bison bison; and few, if any, other large grazing or browsing animals. Raccoons, Procyon lotor, and opossums, Didelphis virginiana, could be expected to have been abundant most of the time in this environment. Perhaps less abundant, but utilized by man, were muskrat, Ondatra zibethica,

river otter, Lutra canadensis, and various small rodents. Some populations of fox squirrel, Sciurus niger, occur in association with the limited stands of pecan and oaks. The bobwhite (quail), Colinus virginianus, and wild turkey, Meleagris gallopavo, would have found some suitable habitat here. A host of song and insectivorous birds could also have found excellent nesting, migrating, and wintering habitat on and near the study area. Evidently, very little permanent fish habitat has been provided here; although, sustained streamflows may have occurred seasonally.

During surveys of the study area, no wild mammals were seen, but raccoon tracks were observed along the creek. No game birds were seen or heard; however, blue jays, Cyanocitta cristata; yellow-billed cuckoos, Coccyzus americanus; starlings, Sturnus vulgaris; purple martins, Progne subis; Carolina wrens, Thryothorus ludovicianus; common flickers, Colaptes auratus; and cardinals, Cardinalis cardinalis, were seen or heard on and near the study area. Cricket frogs, Acris crepitans, could be heard along the stream's edge. Undetermined species of crayfish and minnows (probably of the genus Notropis) were fairly numerous in deeper pools of the stream, which were sometimes as much as 0.5 meters in depth. During the short time of observation, there was a streamflow of approximately 1 to 2 cfs (cubic feet per second), enabling some aquatic fauna to swim upstream or downstream at will.

A considerable variety of plant and animal resources on and in the vicinity of the study area throughout Recent geologic time and up to the present time has probably made it consistently attractive for human inhabitants.

Habitat Summary

Soils at site 41 TV 383 are primarily alluvial in origin. The aggradational process began sometime between 1300 and 600 years ago. Down cutting began sometime prior to 300 years ago as evidenced by the 260+ year old

pecan tree found opposite the site. The present creek is contained by steep valley walls until it crosses U.S. Highway 183.

Boggy Creek, in the immediate vicinity of the site, has remained relatively stable considering the impact of modern man. In the past it is probable that flooding of the Colorado River affected creek dynamics as much as, or more than, drainage runoff. The increased erosion, evidenced by the loss of a substantial portion of the site between 1978 and 1982, may be attributed to increased runoff caused by modern land clearing and the development upstream.

The soil profile observed at the site indicates a series of floodwater depositions and erosions, and slackwater depositions (fine clays). The buildup of sediments at the site locale was fairly rapid, probably as much as 10-cm per year. Fortunately, the sediments sealing the lower cultural horizon at the site were laid down fairly soon after site abandonment--probably by the creek backing up during a flood of the Colorado River.

Natural vegetation around the site would have provided numerous species useful to the inhabitants; not the least of which would have been pecan trees. It is difficult, however, to reconstruct the original vegetational patterns since it is most probable that the entire study area, excepting a few individual trees, was cleared during the late 1800's and farmed until recent times, as evidenced by the discovery of an ammonium nitrate disposal pit.

Archaeological Background

Central Texas, and the Austin area, in particular, has been subjected to more archaeological scrutiny probably than any other portion of the state. It only has been within the last few years, however, that questions on subsistence, settlement patterns, and chronology have been systematically addressed.

Prewitt (1981, pp. 65-89) is the latest in a series of researchers to propose chronological schemes for classifying prehistoric Central Texas cultures. It is not the intention of this section to review past schemes or to comment on Prewitt's work. A rather generalized discussion of the major cultural/temporal periods will be presented here as an interpretive framework.

Paleo-Indian (? - 8500 B.P.)

Very few sites from this time period have been found in Texas. The finds are usually restricted to isolated artifacts or in a disturbed context (McCormick 1979). Probably the most important site yielding information from this time period is presently being excavated by the Texas Highway Department near Leander, Texas. The hallmarks of this period are the large lanceolate projectile points; such as, Clovis, Plainview, and Folsom. This period is best defined on the High Plains where it is associated with the hunting of now extinct megafauna.

Paleo-Indian/Archaic Transition (8500 - 7000 B.P.)

Prewitt (1981, p. 77) calls this the Circleville Phase. It is the period during which Paleo-Indian cultures adapted to hunting and gathering basically modern flora and fauna. Some of the tool types, particularly the projectile points, retain striking similarities to those of the previous period.

Archaic (7000 - 1250 B.P.)

The Archaic period is fairly long and complicated. The people were hunters and gatherers exploiting a diversity of environments. Minor changes in settlement patterns, exploitative strategies, and artifact types allow the internal division of the period into at least ten different phases. Between 5000 B.P. and 2250 B.P., the construction and problematic utilization of burned rock middens in the Central Texas area continues to plague archaeologists as a

Central research issue. During this period the projectile points remain large, and, presumably, were used with an atlatl, a thrusting spear, or as a cutting tool.

Neo-Archaic or Neo-American (1250 - 200 B.P.)

This period is differentiated from the Archaic primarily by the advent of small projectile points thought to represent the use of the bow and arrow, and by the presence of ceramics and cemeteries (Prewitt 1981, p. 74). The early part of the period is called the Austin Phase (1250 - 650 B.P.). It is differentiated from the following Toyah Phase (650 - 200 B.P.) not only on artifactual content, but on the hunting of bison rather than deer as a major protein source.

Previous Studies

During early August 1978, Peter Nichols of Espey, Huston & Associates, Austin, Texas conducted an archaeological survey of Boggy Creek, excluding the lower reaches from Govalle Playground to U.S. Highway 183 (Nichols 1978). This lower section was subsequently surveyed by Robert J. Burton, Senior Archaeologist with the Fort Worth District Corps of Engineers, on 22 September 1978. It was during this latter survey that site 41 TV 383 was found and recorded (Burton 1983).

Burton noted two spatially distinct cultural levels in the cutbank of the creek. The lower lense of cultural debris (charcoal, shellfish, and 30 cm x 10 cm hearth area) was 2.75 m below the surface, and was apparent for 7 meters. The upper zone, 1.60 m below the surface, consisted of a single rock-lined hearth measuring 45 cm x 15 cm in cross section. No diagnostic artifacts were recovered; although lithic debris was noted on the creek bed below the site by Burton (1978). Burton took several pictures of the site area during his survey. These photographs were made available for the present investigations; although, they

proved of somewhat diminished value since the bank morphology depicted, when compared with the present site, indicates that much of the site area seen by Burton had suffered moderate erosion in the four intervening years. Precise measurements of the amount of the site lost cannot be made, but it is estimated that the cutbank has eroded back between 50 cm and 1 meter.

METHODS OF STUDY

Proposed Methods

Several techniques for conducting limited testing of the site area were considered in determining the nature and extent of the buried cultural deposits visible in the exposed creek bank. The usual method for determining extent of deep subsurface cultural deposits is by careful excavation with a backhoe. However, access to the site from the only road entailed crossing the steep-sided creek; while very heavy vegetation blocked access from the north. For this reason, use of a backhoe was considered not feasible.

A second method for site exploration was considered and attempted. This method entailed deep soil probing using a 3.5-inch bucket-type soil auger with a 9-foot reach. This method could be effective for tracing the cultural deposits back from the outcrop. Augering was planned at 5-meter intervals located along cleared transects, and terminating when no more cultural remains would be brought up. At that time, a smaller interval of boring would be used between the last positive and first negative hole, in order to determine limits of the site. The original plan provided for three such transects, which would cover the site area adequately--two running north and south and the third, east and west. The North/South lines would have begun at the edge of the proposed channelization; while the East/West line would start at the site and run east.

Methods Utilized

Field work was begun with an intensive pedestrian reconnaissance of the entire meander loop area. During this operation, several topographic disturbances were noted. First, a 1.5 m x 1.0 m (approximately) indentation was observed extending from the ground surface into the upper section of the site area. This disturbance, however, did not extend into the upper cultural zone. Given the tightness of the soils, this indentation was either produced by man or caused by the undercutting of a moderate-sized tree, which fell into the creek. Second, a 2 m x 3 m shallow pit, lined with ammonium nitrate bags, was found on top of the terrace some 15 meters east of the previously mentioned disturbance.

Vegetation and geologic surveys were conducted by Drs. Alderson and French, respectively, while the crew cleared the original three transects across the meander loop.

The auger testing was begun at 2-meter intervals along the East/West transect. Unfortunately, it was discovered that the auger would not penetrate the clays and gravel deposits which were encountered below 30 cm. This technique was abandoned following consultation with the COE project manager.

Finally, in order to determine the stratigraphic and depositional history of the site, itself, it was decided to cut and clean a profile along the creek bank from which soil, pollen, phytolith, and radiocarbon samples could be collected. It was expected that this procedure might produce cultural features and/or diagnostic artifacts that would aid the archaeologists in determining the age and function of the site. All dirt removed during the preliminary augering and major creek bank excavation was sifted through 0.25-inch hardware cloth, with the exception of samples for fine screening and flotation. The latter samples were returned to C.E.M.'s Fort Worth laboratory for processing.

Careful inspection of the west facing cutbank of the meander loop failed to reveal evidence of the upper hearth noted by Burton (1978). Topographic comparisons between the present situation and older maps and photographs indicated that approximately 1.22 m of bank area had been eroded away in the last four years. Further visual evidence indicated that the most recent creek flooding came to within 1.5 m of the present ground surface at the site. This flood would have partially covered the upper cultural zone, referred to as Zone A.

The lower cultural zone, referred to as Zone B, appeared to be much as described by Burton (1978). It is visible as a charcoal/shell lense for a distance of 9.25 meters. This most definite manifestation of Zone B was found almost directly below the previously mentioned partial excavation of the upper creek bank and some 6 meters from Zone B's western extension. Based on these observations, it was decided to cut a profile down the bank face at this point, since providence had begun that task, already. A 60-cm wooden stake was driven to ground level on the terrace top 50-cm southwest of the profile cut. This was used as datum, and measurements within the site were made in meters below datum (mbd).

The profile was excavated in two stages, because of the height of the bank. A sketch of the profile was prepared, the exposure photographed, and soil samples were taken down its entirety. These samples are to be stored in Austin for future pollen, phytolith, soil, etc. analyses.

Figure 6 is an illustration of the profile. The profile is composed of a series of alternating silty and sandy clays alluvial deposits. A brief description of these sediments is offered in the legend to Figure 6.

Following this operation, a 1 m x 2 m excavation unit was laid out at the top of the profile. As mentioned earlier, this was not a full unit since some of the upper strata were missing. The unit was taken down to the top of the

LEGEND

Descriptions of sediments depicted on Figure 6.*

Stratum Number	Sediment Description
1	Dark brown silty clay loam with rootlets
2	Dark brown silty clay loam (60%+ clay)
3	Medium brown silty clay with 5 to 15 mm diameter gravel inclusions
4	Yellow brown silty clay with small (<5 mm diameter) inclusions
5	Yellow brown silty clay with some sand
6	Yellow brown clay with tan clay inclusions
7	Reddish brown fine sandy clay
8	CULTURAL ZONE A--dark grayish-brown gravelly silty clay
9	Dark brown mottled blocky clay
10	Tan mottled blocky sandy clay
11	Dark brown blocky silty clay with river cobbles (40 to 60 mm diameter)
12	Medium brown silty clay with organic carbon flecks
13	Light brown silty clay with few snail shells
14	Medium brown silty/sandy clay
15	Reddish brown sandy clay
16	Medium brown silty clay with darker brown laminations
17	CULTURAL ZONE B--dark brown silty clay loam
18	Medium brown blocky silty clay
19	Reddish brown silty clay
20	PRESENT STREAMBED--gray laminated fine clay

*pH for all levels ranged between 8 and 9.

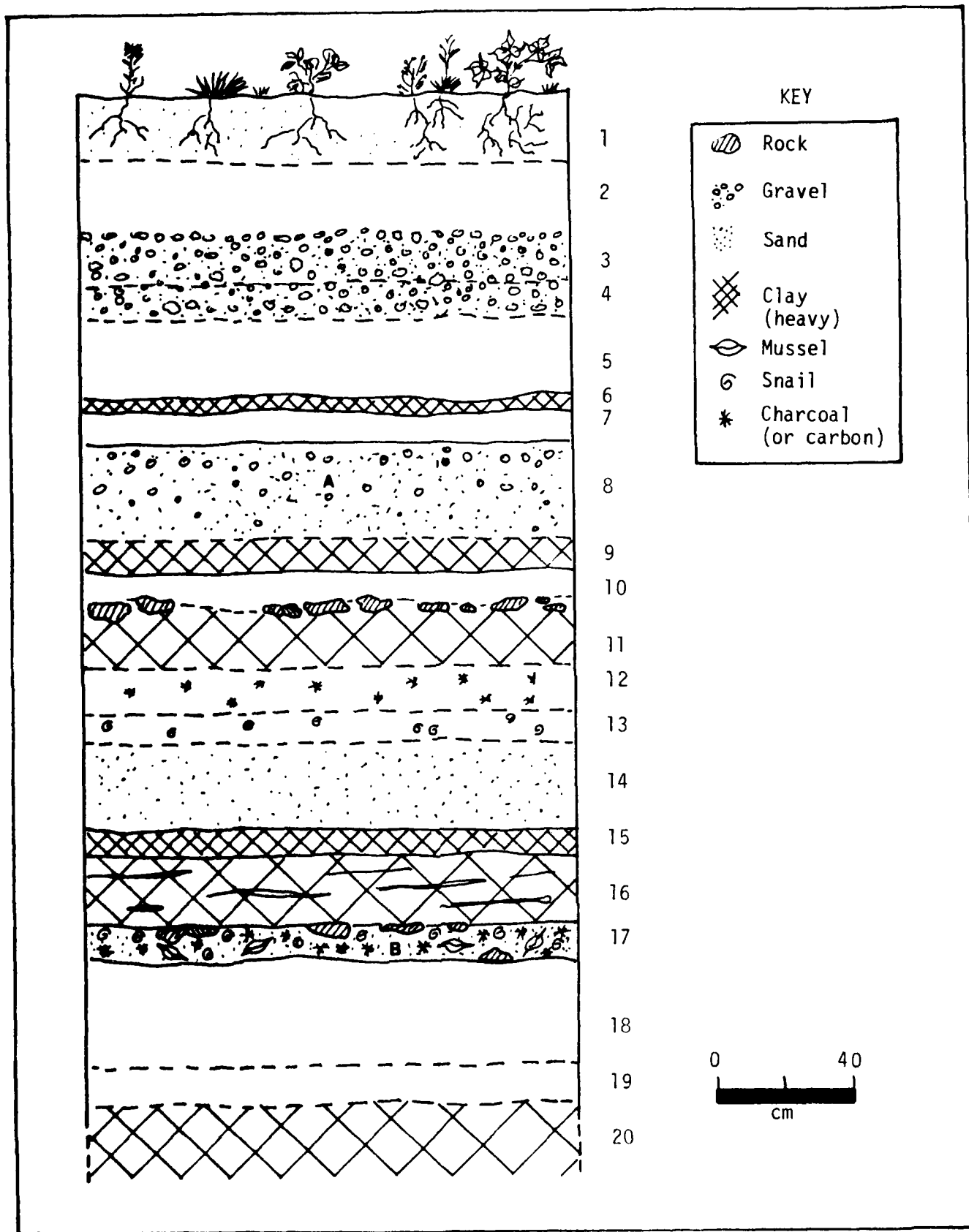


Figure 6. Profile of Creek Bank at Site 41 TV 383. Cultural Zone A is in stratum 8 and Cultural Zone B is in stratum 17.

first cultural zone by natural strata (Figure 6, stratum 8). Samples of the upper strata (1-7) were screened, but the majority of the fill was simply shovel-removed and trowel-checked after screening failed to produce cultural debris. Cultural Zone A (stratum 8) was excavated in 5-cm levels and carefully screened using 0.25-inch hardware cloth.

Excavations were continued using natural strata and screening only a 10% sample down to the top of Cultural Zone B (stratum 17). Shovel skimming was used until the first shells and charcoal were encountered. The top of the zone was then carefully exposed, using trowels, with all shell, bone, and artifacts being left in-situ. This surface was photographed (see Figure 7), and all visible materials were collected before removal of more fill to expose additional cultural materials.

Following excavations, the site was covered with black plastic and backfilled as much as possible. The profile, of course, could only be covered with the plastic. It is unlikely, however, that this portion of the site will survive many more floods. The proposed channelization would offer the remaining site its best protection from natural destruction, but the proximity of the site to the housing development renders the site to be susceptible to vandalism (see Recommendations, p. 36).

After backfilling and before leaving the site area, a line of blue and white flagging was established in a semicircle around the site area. The distance east of the profile was twice the approximately 9-meter long deposit of Zone B visible in the cutbank. It is admitted that this is somewhat arbitrary. However, for geological reasons, already explained, the proposed construction should not disturb the site regardless of its exact dimensions.

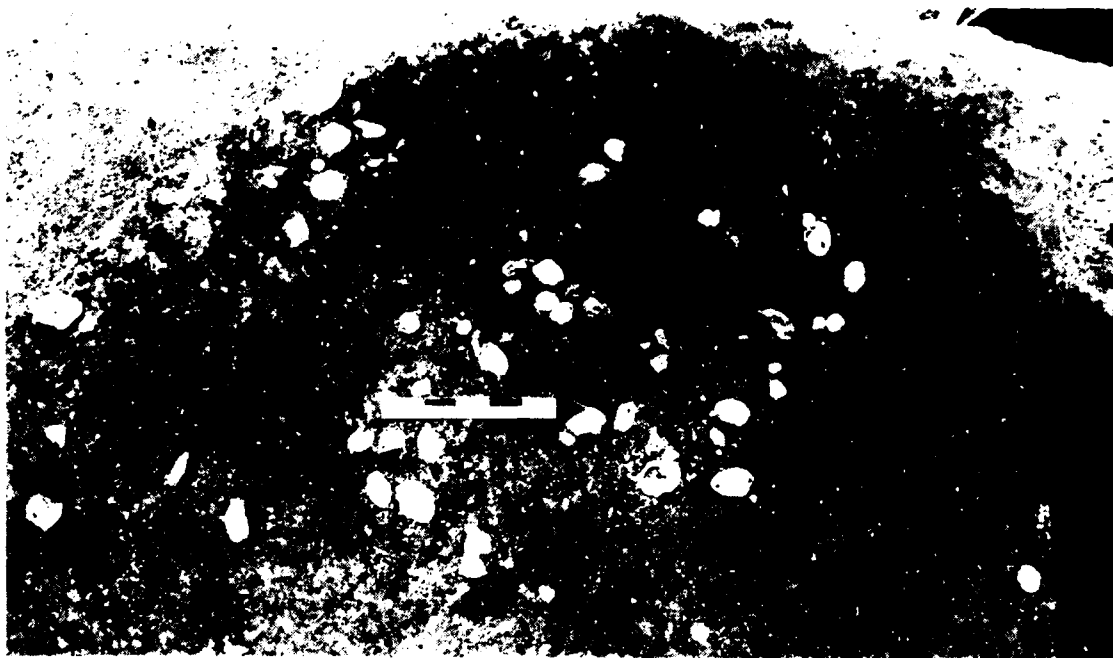


Figure 7. Distribution of Artifacts and Shell in Zone B



Figure 8. Charcoal Lined Depression in Zone B.

RESULTS OF INVESTIGATIONS

The sedimentary sequence noted in the profile cut down and into the creek bank is illustrated on Figure 6. A detailed sediment analysis was not carried out, inasmuch as it was not part of the Scope of Work. It appears, however, that all the sediments are alluvial in origin, and range from very fine silty clay to coarse sandy deposits containing gravels.

Cultural Zone A (1.02 m → 1.30 mbd) - Stratum 8)

The sediments of Cultural Zone A consist of a dark grayish-brown gravelly, silty clay, grading into dark grayish-brown silty clay. The amount of small to medium gravel in the deposit suggest that substantial flooding originated from the upper areas of the stream drainage rather than backup from the Colorado River.

A total of five artifacts were recovered from Zone A (Table 3). Unfortunately, none of these artifacts were time-diagnostic; although all were of native Georgetown chert. It is somewhat surprising that more lithic debris

Table 3. Artifacts collected at Zone A during testing at site 41 TV 383.

- 1 - chopper-like core (chert) (see Figure 9E)
 - 2 - core fragments (1 chert, 1 fine-grained tan quartzite)
 - 1 - chunk (chert)
 - 1 - primary flake (1/3 of a medium chert river cobble)
-

was not found. This lack of lithic debris combined with the fact that the artifacts were spread throughout Zone A may be an indication that the excavation unit was on the disturbed edge of an activity area centering on the stone-lined hearth noted by Burton in 1978. It is hypothesized that this hearth was located in stratum 8; but this cannot be verified because of recent erosion of the bank.

Cultural Zone B (2.56 → 2.66 mbd) - Stratum 17

The sediments at Cultural Zone B consist of a dark brown silty clay loam, containing large amounts of charcoal and snail shells, in addition to fire-cracked rock and a few pieces of lithic debris scattered throughout its manifestation in the creek bank. Two special features were noted--one in the excavation unit, and one to the northwest but still in Zone B.

Feature 1

Inspection of the profile for Zone B revealed a small basin shaped, charcoal lined depression measuring approximately 40-cm across by 20-cm deep. A 20-cm deep cross section was cut through the basin (Figure 8, p. 24), which showed that it indeed had been a small excavation in which the fill was texturally different from the surrounding deposit--being much more coarse grained and containing slightly more charcoal. In addition, several pieces of fire-cracked rock were found in direct association with the pit.

The fill removed to profile the basin was placed in plastic bags, sealed, and returned to C.E.M.'s laboratory for processing. This included flotation and fine screening of half of the sample. The screening consisted of placing the material through a 2 mm, 1 mm, and 500 μ m set of nested precision geological sieves. The other half of the sample (2.50 kg) was dried under controlled conditions, and will be stored with the other artifacts and samples for future analysis.

Feature 2

A small ash lens (40 cm x 2 cm) was located in the cutbank 4.65 m northwest of the study profile at a depth of 2.59 m below datum. A sample of the ash was recovered and will be stored with other materials collected at the site. The ash was situated within the northwestern extension of Zone B.

The remaining section of Feature 2 was not excavated, but was left for additional field research. The excavated area was covered with black plastic and backfilled as much as possible.

A total of 164 lithic artifacts (excluding fire-cracked rock) were collected from Cultural Zone B (Table 4). Of this number, 119, or 72%, are flakes and chips and 13% are chunks, bringing the debitage total to 85% of the total lithics. As with Zone A, all lithic specimens were of local Georgetown chert. Two projectile points were found. One is a Scallorn type, while the other has been so modified and burned that its original shape is questionable (Figure 9, B and C). The latter may be Bulverde-like, but positive identification is difficult because over 90% of its surface area is fire spalled and cracked, and one shoulder had previously been broken and reworked. This point, if it is a Bulverde, may have been a curated item and is not considered as time-diagnostic for occupation at the site based on the presence of a positively identified Scallorn point in the same level.

Evidence for tool manufacture is limited, but may be reflected in the biface, which was broken during manufacture; the two flake cores; and the blades. It appears that the reworking of existing tools was important, at least in this portion of the site, based on the fact that 76% of the flakes were "interior" (no cortex on dorsal surface).

Evidence of food processing may be indicated by the retouched flakes; flake scraper; and, certainly, by the faunal samples. The sample of fire-cracked rock reflects either the use of the rocks for stone boiling or in a hearth situation. The former is considered most likely because of the crazed and friable nature, and the lack of fire discoloration of most of the rock samples. It should be mentioned here that boiling would have been one of the most effective methods for opening the clams.

Table 4. Artifacts collected at Zone B during testing at site 41 TV 383.

Tools

- 1 - Scallorn projectile point (Figure 9C)
- 1 - possibly reworked, heavily fire spalled Bulverde-like point (Figure 9B)
- 1 - flake scraper (Figure 9D)
- 4 - retouched flakes (1 secondary, 3 interior)
- 1 - small broken biface base
- 9 - blades (2 micro-blades)
- 1 - polished and striated tip off bone tool (burnt)

Debitage

- 41 - flakes (primary = 1, secondary = 9, interior = 31)
- 78 - chips
- 4 - interior biface thinning flakes
- 2 - flake cores (Figure 9A)
- 21 - chunks

Groundstone

- 1 - metate fragment (burnt, poorly indurated, sandy silt-stone)

Miscellaneous

- 65 - fire-cracked rock fragments
- 1 - piece of fired clay

Bone

- 1 - deer left innominate fragment
- 1 - deer cervical vertebra spine
- 1 - deer phalanx fragment
- 1 - deer unidentified long bone fragment
- 2 - deer cervical vertebra facet fragments
- 3 - deer antler fragments (2 burnt)
- 29 - deer-size unidentified mammalian bone fragments (13 burnt)
- 1 - dog left humerus fragment
- 2 - unidentified mammalian fragments
- 1 - unidentified nonmammalian fragment
- 1 - unidentified rodent bone fragment
- 5 - large fish bone fragments
- 2 - box turtle shell fragments (burnt)

Shell

- 80 - Bivalvia (Pelecypoda)

Quadrula houstonensis (Lea) - normally found in large streams or small creeks with gravel or fine sand bottoms. More common today in south rather than central Texas.

	<u>Right</u>	<u>Left</u>	<u>Total</u>
Large	16	10	26
Intermediate	16	12	28
Small	<u>8</u>	<u>18</u>	<u>26</u>
Total	40	40	80

Table 4. (concluded)

32 - hinge fragments

129 - Gastropoda

Rabdotus dealbatus (Lea) - 121 adult, one-year class shells; 52 slightly smaller adult; and 6 small (± 5 mm) juvenile shells. Common to understory woodland vegetation in river and creek bottoms throughout central Texas.

Helisoma trivolvis Say - 1 adult shell. Habitat, gently flowing or standing bodies of water.

Mesomphix friabilis (Binney) - 5 large adult, 1 intermediate, and 6 small juvenile shells. Freshwater's edge in moist mulch or under leaves.

Helisoma orbiculata Say - 2 adult. Land snail on low bushes and grass.

Hawaila minuscula Binney - noted on fine screen. Habitat, moist leaf mold areas beside water.

Gastrocopta sp. - noted on fine screen. Habitat, moist leaf mold beside freshwater.

Species identification was based on mollusk collections of the Fort Worth Museum of Science and History, as well as the following references: Cheatham and Fullington (1971), Clark and Berg (1959), Emerson and Jacobson (1976), and Strecker (1935). All of the species are common to Travis County and tributaries of the Colorado River.

Fine Screen Samples (Zone B basin area)

2-mm screen:

- 5 - micro-flakes
- 14 - micro-chips
- 1 - fire-cracked rock fragment
- 6 - hackberry seed fragments (1 burnt)
- 4 - bone fragments (1 rodent, 3 unidentified)
- 39 - shell (1 burnt bivalve fragment, 38 micro-gastropoda)

1-mm screen:

- 6 - micro-chips
- 3 - hackberry seed fragments
- 3 - bone fragments
- 22 - micro-gastropoda

500- μ m screen:

- 5 - micro-gastropoda

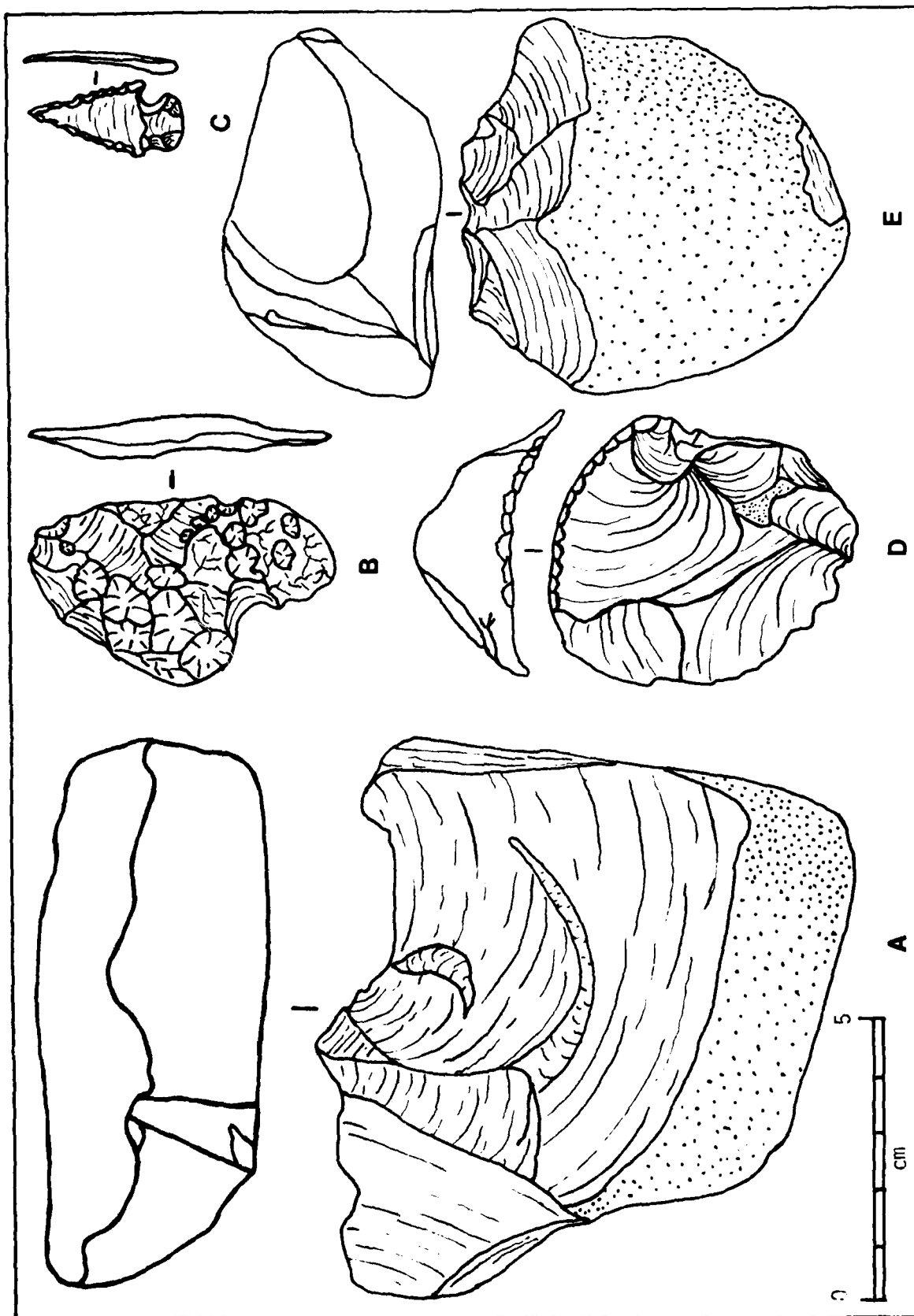


Figure 9. Artifacts Recovered at Site 41 TV 383. [A] Large Core/Chopper, Zone B; [B] Heavily Burned Reworked Projectile Point, Zone B; [C] Small Projectile Point, Zone B; [D] Retouched Flake, Zone B; [E] Small Core/Chopper, Zone A.

The presence of hackberry (Celtis laevigata or reticulata) seed fragments in the fine screen samples may be fortuitous, although the hackberries surely would have been available to the inhabitants of the site. Both the berries and the roots were utilized by native groups, particularly during the fall (Palmer 1871, pp. 404-428). Of the 1200 seeds recovered at the Hoxie Bridge site, 50% (615) were hackberry (Bond 1978, p. 219). However, hackberry seeds most certainly would have dropped on the site through natural means; and their presence cannot positively be associated with man's activities.

The high pH (8-9) of the soils at the site mitigate against the preservation of pollen. Samples from the center of Zone B were checked for pollen occurrence by scanning electron microscopy at Spectrum Laboratories Inc. of Dallas, Texas. No recognizable pollen grains were found in the samples, which were completely scanned at 3000X magnification. All vegetal matter was highly degraded and unrecognizable. Other soil samples were taken for possible later pollen analysis, and they will be stored with the other materials from the site at Texas Archaeological Research Laboratory in Austin. It is always possible that new developments in the field of palynology will make these samples usable at some latter date.

Conclusions based on the distribution of the Gastropoda and Bivalvia specimens collected from Zone B must remain tentative, partly because of the small sample size, but primarily because of the limited area of the site investigated. It is of interest to note that neither the total number of left and right valves nor the frequencies for the 3-year classes match (Table 4). This distribution may be spurious considering the size of the excavation unit, but may also reflect either the manner of food preparation or eating customs of the sites' prehistoric inhabitants. It is unlikely that the distribution of right to left valves is random. However, since the human activity represented in Zone B is incompletely known, a definitive statement as to how the shells were distributed is difficult.

There does not appear to be selection for shell size, which might indicate a mass-gathering rather than a single hand-gathering technique of collection (e.g., "clam rake").

If the bivalves were being eaten on the half-shell, one might expect to find a dominance of the right or left valve over the other in a specific locus. The fact that right and left valves are present in roughly equal numbers may be interpreted as an indication that the clams were opened and shucked either before or after cooking, and eaten or used in another manner after removal from the shell. The fact that no matches could be made between valves is another indication that only a portion of the activity area remains. Shell malformations and irregular growth rings indicate variable environmental conditions; such as, intermittent ponding and severe winters (Neck 1983, p. 150).

Snail shells appeared throughout the entire profile at 41 TV 383, but they tended to be concentrated in Cultural Level B. It is probable that the lush vegetation on the site, that could result from the increased organic content of the soil following human abandonment, could have attracted the gastropods. If, however, they were collected for food, no visible evidence might remain, since boiling would not alter the shells' appearance appreciably, and flooding of the site would tend to distribute the remains in a more random appearing fashion (Neck 1983, pp. 151-152).

The faunal remains recovered are quite consistent with what would be expected at an Austin Phase site. The deer, fish, and turtle bone fragments most probably represent direct food remains, while the rodent bones may be intrusive. Only one long bone fragment showed signs of rodent gnawing--an indication that the site was sealed shortly after abandonment. The presence of an unburnt dog humerus (Canis sp.) was not expected, but dog bones have been noted at sites of similar age (Bond 1978, p. 198). No speculation is offered here as to the relationship between the presence of dogs and the site's inhabitants.

The single bone tool (19 mm x 4 mm) that was found may have been the distal section, minus the tip, of an awl or bone punch. The bone had been burned, but still shows a high degree of polish and parallel striations along its entire surface. This tool may have been utilized in the manufacture and/or repair of clothing or basketry, and may be an indication of the presence of women at the site.

On the basis of the Scallorn projectile point, it is felt that the site should date to the Austin Phase of the Neo-Archaic (Neo-American). Prewitt (1981), in the latest attempt to establish a chronological framework for Central Texas, defines the Austin Phase of the Neo-Archaic Stage (Post-Archaic or Neo-American, etc.) as falling between 1250 B.P. and 650 B.P. (A.D. 700 to A.D. 1300). He mentions diagnostic artifacts and features for the Austin Phase sites, including small basin-shaped hearths, burned clay and charcoal lenses, and Scallorn type projectile points (Prewitt 1981, p. 83).

Prewitt has proposed a hunting and gathering subsistence base for the Austin Phase people, with a food dependence on deer. He mentions that freshwater mussels, while utilized, are not as common as in the preceding Archaic phases (Prewitt 1971, p. 83). Bond noted a singular absence of mussel shells at the Hoxie Bridge site, but did note moderate quantities of snail shells (Bond 1978, pp. 208-216). To date, there is no hard evidence that any Central Texas aboriginal group utilized snails as a food source.

Half of the collected charcoal was sent to Beta Analytic Inc. in Coral Gables, Florida. First, the charcoal sample was pretreated by picking out any rootlets that might be present. The sample was then given a hot acid wash to eliminate carbonates; rinsed to neutrality; and, subsequently, given a hot alkali soaking to remove humic acids. The sample was rinsed again to neutrality, and given another acid wash and neutralizing rinse. Finally, it was subjected to benzene synthesis and counting.

The resulting C¹⁴ date of 2140 ± 110 B.P. came as somewhat of a surprise, since it is approximately 800 years earlier than expected. It is unlikely that the sample was contaminated following collection, and Beta Analytic Inc. reported no problems with the processing of the sample. Several possible explanations for this discrepancy in dates are suggested.

1. The charcoal was carried into the site by flooding and erosion of an older site upstream. This is a remote possibility since the artifacts and shells showed little evidence of disturbance.
2. The site may have been subjected to post-depositional contamination. This is considered unlikely as chemical or physical alteration of charcoal usually, but not always, results in more recent dates.
3. The Austin Phase occupation was imposed on a previously established Archaic Period site. This sequence might explain the presence of the burnt Archaic-like projectile point. This explanation is considered unlikely, inasmuch as the surface upon which the Archaic site was created would have had to remain stable--no flooding or deposition--for a period of some 800 years.
4. The Austin Phase of the Neo-Archaic (Neo-American) extends back further in time than previously thought. If this were true, similar evidence would have been found at other sites. The Hoxie Bridge site (41 WM 130) produced a date of 800 ± 70 B.P., which is entirely consistent with other Austin Phase sites (Bond 1978, p. 230).

It should be emphasized that, historically, reliance on a single radio-carbon date has proven embarrassing to many researchers.

SUMMARY AND RECOMMENDATIONS

Site 41 TV 383, first discovered in 1978 in a cutbank meander of Boggy Creek, was subjected to limited testing by a team of archaeologists from Coastal Ecosystems Management, Inc. during the latter part of June 1983. Unfortunately,

flooding during the intervening years had eroded away a portion of the site, and researchers were unable to locate one of the previously recorded cultural features.

Two spatially separated cultural zones were observed at the time of the first recording of this site--one containing a rock-lined hearth; and the other, charcoal, shell, and lithic debris. It was feared that the proposed relocation of the channel of Boggy Creek would damage these buried cultural deposits, since neither their nature or extent could be discerned from visible manifestations in the creek bank.

Cultural Summary

Investigations described in this report indicate that both cultural zones probably represent one or more short-term encampments by a small group or groups of persons during late prehistoric times. It is not possible to describe adequately the upper occupational zone (Zone A), except that it appeared ephemeral according to examination of the portions exposed along the creek bank. The lower occupation (Zone B) occurred at some time during the period between 2100 and 600 years ago--but most probably during the temporal/cultural period designated as the Austin Phase (1300 - 600 B.P.). This early encampment, as mentioned, was brief--probably being occupied not more than several weeks at most.

It appears that Cultural Zone B is approximately one-half of a small activity area, approximately 2.50 meters in diameter, utilized for the preparation of food resources and possibly other secondary endeavors; such as, hide processing and tool resharpening. Food preparation centered around a small unlined basin hearth (Feature 1).

One of the primary food resources utilized by this group appears to have been freshwater bivalves. This apparent food source could, however, be a product

of either differential preservation and/or food preparation techniques. Other animal species represented within the site include fish, box turtle, and deer. An ash deposit (Feature 2) located northwest of the excavation unit activity area may represent a smudge pit for either insect control or hide smoking.

It is possible that the group was accompanied by one or more domestic or semidomestic dogs. Several tools were manufactured or refurbished. Considering the presence of the scraper and blades, it is possible that the hide from the deer was processed. Mollusk and ethnobotanical remains are inconclusive as to the season of occupation, but the estimated young age of the deer (<1 year) and the lack of readily available pecans and presence of hackberry seeds indicate a late summer occupation.

Shortly after the creation of Zone B, the site was sealed with sediments deposited by slowly rising waters. Initial flooding could account for the even distribution of charcoal and snail shells over the site. This situation was most likely created by a backup of water in Boggy Creek in response to flooding of the Colorado River. The high pH of the soils inhibited the preservation of pollen.

Recommendations

It is felt that site 41 TV 383 is eligible for nomination to the National Register of Historic Places based on the following considerations:

1. Site integrity. The lower occupation is probably a single component dating between 1300 and 600 years ago.
2. The site contains discreet activity areas, relating to subsistence patterns with only very minor post-depositional disturbance.
3. Preservation of floral and faunal samples is excellent, and the site appears to have been sealed soon after occupation.

4. The site offers future researchers an unique opportunity for answering questions as to small creekbank settlement and subsistence during the Austin Phase. This potential is true even if only a small portion of the site remains.

Small intermittently occupied late prehistoric sites, such as 41 TV 383, are generally ignored in favor of larger more continuously occupied sites. Unfortunately, very few of the latter are single component--the TAS field school site 41 WM 437 excepted--and most usually produce mixed-component assemblages for the later prehistoric period. The Boggy Creek site offers researchers a chance not only to view a single component site, but one with discrete activity areas. Several problems which might be addressed during future investigations include:

1. Internal activity area variation which could be analyzed through point-provenience recording of activity areas. Specific plottings of all shell, artifacts, etc. might reveal intra-activity area patterning.
2. Climatological/sedimentological variations could be investigated through detailed analysis of the sediments present at the site. The stratigraphy at 41 TV 383 is well preserved and contains historical data on the hydrology of Boggy Creek. Recent work in reservoirs in Williamson County and near Leander, Texas has demonstrated that archaeological resources, even of relatively recent antiquity, may be much more deeply buried than previously suspected. Site 41 TV 383 could provide researchers with an opportunity to define criteria for the establishment of a predictive model to aid in the location of other sites in similar environmental and physiographic situations.

Considering that it is unlikely that proposed construction will impact the site, it is further recommended that some of the dirt from the proposed channelization be used to fill the existing channel of Boggy Creek to present

ground level after a permanent datum of concrete and bronze is placed on top of the site for positive relocation. In this manner the site would be preserved for future investigation with a minimum of effort and expense. It is further recommended that a qualified archaeologist be present during channelization to insure site protection.

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MAP

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ARCHAEOLOGICAL INVESTIGATIONS AT SITE 41 TV 383,
LOWER BOGGY CREEK, COLORADO RIVER
DRAINAGE, TRAVIS COUNTY, TEXAS

ADDENDUM

Page 25, Table 3

Table 3. Artifacts collected at Zone A . . .
addendum to Table 3

	Weight (gm)
Chopper-like core	531.040
Core fragments	
chert	5.1367
quartzite	60.285
Chunk	56.5159
Primary flake	51.6010

Page 28, Table 4

Table 4. Artifacts collected at Zone B . . .
addendum to Table 4

	Length (mm)	Width (mm)	Thickness (mm)	Weight (gm)
Scallorn projectile point	35	13	2.75	0.7790
Bulverde-like point	52.25	30 (at shoulder)	7.25	8.5059
Flake scraper	52.60	51.50	16.70	40.9669
Retouched flakes (4)				
secondary				13.1020
interior				22.1022
				4.1026
				1.1029
Broken biface base	29.50	1.25 (basal) 6 15 (distal)		3.0621
Blades (9)	(maximum)	(midpoint)	(midpoint)	
	64.50	2.20	4.75	8.6881
	50.55	20.22	5.50	11.5874
	56.00	20.02	4.95	6.2351
	43.50	19.25	3.25	3.2905
	53.00	27.00	5.50	8.0634
	37.00	13.25	4.95	2.1200
	...	21.00	4.00	...
	17.00	0.95	3.50	0.6322
	14.25	0.50	1.25	0.160

Addendum (concluded)

Table 4. (addendum concluded)

	Length (mm)	Weight (gm)
Bone tool fragment	15.80	0.3515
Debitage		628.16
Metate fragment		230.06
Bone		42.5861

ADDENDUM: SITE TESTING 41TV383

1. Activity area in zone B is intact, as indicated by the fact that two flakes could be refitted, several large flakes of Edwards chert looked to be part of the same chipping episode, the hearth contained charcoal, as did the surface of the site, and the left and right halves of mollusks shells were discarded differentially in the excavated unit.
2. The extent of the site is unknown beyond the seven meters showing in the bank. Two features were found within zone B (in 1978 and 1983), and more may lie to the east. However, even if there remains only a narrow strip of site, the in situ nature of the deposits, abundant floral and faunal remains, and good artifact density suggest much information of value can be obtained from the site. Functional data, obtained with point provenience excavation, can especially be derived from this stream bank site.
3. The upper occupation, zone A, while not yielding much information, in the current test, contained a hearth in 1978 indicating occupation may be centered elsewhere than the test. Very deep deposits and a hard clay layer above zone A prevented auger tests from determining the extent of either occupation.
4. The negative pollen result reported on page 31 may not be entirely accurate, since normal concentrating procedures for archeological pollen samples were not performed. Three samples of soil, each only 3/8 " diameter, were viewed with a scanning electron microscope. In normal pollen analysis, 250 ml of soil is often reduced to produce only 20-100 pollen grains. Thus, the small sample scanned by the SEM was not likely to reveal pollen.

ROBERT J. BURTON

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